

IN THE DRAWINGS

Attached hereto is a replacement sheet labeled "REPLACEMENT SHEET", for both Figs. 2 and 4, for approval and acceptance by the Examiner. Upon approval and acceptance, new drawings will be submitted.

REMARKS

In paragraph 1 of the Official Action, the Examiner has acknowledged receipt of the papers submitted under 35 USC 119 (a) – (d), perfecting applicants claim for priority. Accordingly, applicant should be entitled to the date of September 20, 1999, as the effective filing date of the subject application, based upon the claim to priority to the corresponding Japanese Application 11-266090, filed on September 20, 1999.

Applicant has amended page 1 of the specification to correct the title of the invention to read "WOBBLE SIGNAL DETECTION CIRCUIT HAVING A LOWPASS FILTER FOR DETECTING A WOBBLE SIGNAL WITH REDUCED SAMPLING NOISE". Applicant believes that this amended title is descriptive of the subject invention to which the claims are directed in accordance with the elected and examined species. Accordingly, the objection to the title should be withdrawn.

Applicant has submitted replacement sheets for Figs. 2 and 4 in response to the objection to the drawings under 37 CFR 1.83(a). Applicant now believes that the drawings show every feature of the invention specified in the claims. Upon approval of the replacement sheets by the Examiner, applicant will submit new formal drawings.

The rejection of claims 2 and 7 under 35 USC 112, first paragraph, as failing to comply with the written description requirement is respectfully traversed. Applicant has amended claims 2 and 7 to clearly define the invention in conformity with the written description requirement. In claims 2 and 7, as currently amended, photodetector includes first, second, third and fourth detector parts detecting corresponding light beams reflected from the spot and outputting respective detection signals corresponding to power level of the detected light beams, the photodetector being split along the scanning direction into first and second half portions, the first half portion being split along a direction perpendicular to the scanning direction into the first and second detector parts and the second half portion being split along the direction perpendicular to the scanning direction into the third and fourth detector parts, and that the sample-and-hold circuit samples and holds the detection signals output from the first, second, third and fourth detector parts of the photodetector.

The rejection of claims 2 and 7 under 35 USC 112, first paragraph, should now be withdrawn.

The rejection of claims 1 and 6 under 35 USC 103(a) as being unpatentable over Horino et al alone or in combination with either Ando et al or JP 9-270137, is respectfully traversed.

The US filing date of the cited reference Horino et al is December 27, 1999, which date is subsequent to the priority date of the subject application of September 20, 1999. Accordingly, the Horino et al reference is improper and should be withdrawn.

Notwithstanding the above, Horino et al is not a relevant teaching to the subject invention as claimed in claim 1, which requires a circuit for sampling and holding the first and second detection signals output from said photodetector during the recording of the data onto the optical disk, as set forth on lines 19-23 of claim 1. Horino et al in Col. 3, lines 44-46 specifically states that "no sample-and-hold circuit is employed in the present invention". This denial of the need for or use of a sample-and-hold circuit eliminates Horino et al as a reference to the subject invention which requires and claims a sample-and-hold circuit. Moreover, as recited in claim 1, the wobble signal detection circuit also specifically requires "lowpass filter means for reducing noise components...being generated by sampling the respective first and second detection signals in said sample-and-hold circuit". Horino et al not only emphatically stipulates that no sample-and-hold circuit is employed, but furthermore does not teach or suggest the use of lowpass filter means much less an arrangement using a lowpass filter for reducing noise components generated during the sampling of the first and second detection signals in a sample-and-hold circuit which Horino et al does not employ or wish to employ. Accordingly, Horino et al is not an appropriate reference independent of its filing date and the rejection based upon Horino et al as the primary reference should be withdrawn.

The Examiner has made certain statements regarding the present invention and the use of "appropriate" filters for removal of frequency signals which indicates a misunderstanding of the subject invention. Moreover, the Examiner is relying on "generalities" unsupported by any disclosure in the references specific to the subject invention which is contrary to the requirements of 35 USC 103.

In accordance with the subject invention, as claimed, the wobble signal is generated from a detection circuit which includes a sample-and-hold circuit, lowpass filter means and a subtraction circuit. It is important to the subject invention to arrange the sample-and-hold circuit, lowpass filter means and subtraction means such that the lowpass filter means is located previous to the subtraction means. This arrangement prevents the frequencies of the sampling noise component to be shifted to a lower frequency band in the subtraction means which would prevent the sampling noise components from being minimized or reduced by the lowpass filter means. As a result, the present invention achieves the unexpected result of removing the sample noise components before the subtraction means generates the wobble signal. This circuit arrangement as claimed in claim 1 is not taught or suggested in any of the references taken alone or in combination.

The above explanation is also applicable to the rejection of claims 1 and 6 under 35 USC 103(a) as being unpatentable over Ogawa et al taken alone or in combination with Ando et al (JP 9-270137) which rejection is also respectfully traversed.

Ogawa et al does not teach the use of a sample-and-hold circuit and does not disclose or suggest the use of a lowpass filter much less an arrangement of a combination of a sample-and-hold circuit, lowpass filter means and subtractor with the lowpass filters located previous to the subtractor. Accordingly, Ogawa et al is not an appropriate reference whether taken alone or in combination with Ando et al and/or JP 9-270137. Accordingly, the rejection of claims 1 and 6 under 35 USC 103(a) should be withdrawn.

The rejection of claims 1 and 6 under 35 USC 103(a) as being unpatentable over JP 09-326122 considered with Ogawa et al is respectfully traversed.

The Examiner's remarks concerning the rearrangement of circuit components is, at best, a generality since Ogawa does not teach the circuit components of claim 1 and JP 09-326112 does not disclose or suggest use of a low pass filter for reducing sampling noise components from the output of a photodetector. In the present invention, the lowpass filter means functions to prevent the frequencies of the sampling noise components from being shifted to a lower frequency band in the subtraction means. Accordingly, the arrangement and placement of the low pass filter means and its function is critical to the invention so that the wobble signal will not include sampling noise. In sharp contrast, JP 09-326112 teaches

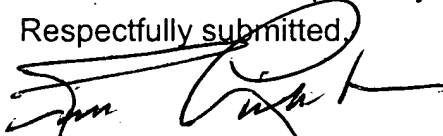
the use of a lowpass filter 34 for use to extract the envelope components i.e. the EFM signal component so that the subtracted envelope component can be used as the control voltage to correct the voltage V1 in the variable amplifier circuit 31. The purpose of the lowpass filter 34 in JP 09-326112 has no relevance to the purpose of the lowpass filters 40 and 42 in the present invention and does not teach a circuit arrangement as taught in claim 1. Accordingly, the reference JP 09-326112 is clearly not relevant by itself to the claims. Moreover, no basis exists for combining the teaching of this reference with Ogawa et al. Accordingly, the rejection of claims 1 and 6 under 35 USC 103(a) as being unpatentable over JP 09-326122 considered with Ogawa et al should be withdrawn.

Claims 2 and 6 which stand rejected as being unpatentable under 35 USC 103(a) over the art applied to claims 1 and 6 and to the alleged "Official Notice" taken by the Examiner is respectfully traversed. Claims 2 and 7 are dependent claims and are therefore clearly patentable over the prior art for the reasons given heretofore in connection with claims 1 and 6. In addition, claims 2 and 7 have been substantially amended to clarify the subject matter upon which they are based, namely the photodetector in the wobble signal detection circuit.

Accordingly, claims 2 and 7 are believed patentable and the rejection thereof should be withdrawn.

Reconsideration and allowance of claims 1-7 is respectfully solicited.

Respectfully submitted,



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CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Post Office by first class mail addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 21, 2004.

Signed: 

Dated: December 21, 2004

TITLE OF THE INVENTION

WOBBLE SIGNAL DETECTION CIRCUIT HAVING A LOWPASS FILTER
FOR DETECTING A WOBBLE SIGNAL WITH REDUCED SAMPLING NOISE

CLAIMS

1. (Original) A wobble signal detection circuit for an optical disk apparatus which detects a wobble signal by focusing a light beam into a spot on a pregroove on an optical disk during recording of data onto and reproduction of data from the optical disk, and includes a photodetector which detects first and second lights from first and second portions of the spot, respectively, and outputs first and second detection signals corresponding to respective power levels of the first and second lights, the first and second portions being formed by splitting the spot into two portions in parallel with a scanning direction, said wobble signal detection circuit comprising:

a sample-and-hold circuit sampling and holding the first and second detection signals output from said photodetector during the recording of the data onto the optical disk;

lowpass filter means for reducing noise components of the respective first and second detection signals, the noise components being generated by sampling the respective first and second detection signals in said sample-and-hold circuit; and

subtraction means for calculating a difference between the first and second detection signals respectively output from said lowpass filter means so as to obtain the wobble signal.

2. (Currently Amended) The wobble signal detection circuit as claimed in claim 1, wherein:

said photodetector ~~detects third, fourth, fifth and sixth lights from third, fourth, fifth and sixth portions of the spot, respectively, and outputs thirds, fourth, fifth and sixth detection signals corresponding to respective power levels of the third, fourth, fifth and sixth detected lights, the third and fourth portions being formed by splitting the first portion into two portions perpendicular to the scanning direction, and the fifth and sixth portions being formed by splitting the second portion into two portions perpendicularly to the scanning direction~~

includes first, second, third, and fourth detector parts detecting corresponding light beams reflected from the spot and outputting respective detection signals corresponding to power levels of the detected light beams, the photodetector being split along the scanning direction into first and second half portions, the first half portion being split along a direction perpendicular to the scanning direction into the first and second detector parts and the second half portion being split along the direction perpendicular to the scanning direction into the third and fourth detector parts; and

said sample-and-hold circuit samples and holds the ~~third, fourth, fifth and sixth~~ detection signals output from the first, second, third, and fourth detector parts of said photodetector during the recording of the data onto the optical disk,

said wobble signal detection circuit further comprising adding means to which the ~~third, fourth, fifth and sixth~~ detection signals output from the first, second, third and fourth detector parts are supplied from said sample-and-hold circuit so that the ~~third and fourth~~ detection signals output from the first and second detector parts are added to be supplied to said lowpass filter means, and the ~~fifth and sixth~~ detection signals output from the third and fourth detector parts are added to be supplied to said lowpass filter means.

3. (Original) A wobble signal detection circuit for an optical disk apparatus which detects a wobble signal by focusing a light beam into a spot on a pregroove on an optical disk during recording of data onto and reproduction of data from the optical disk, and includes a photodetector which detects first and second lights from first and second portions of the spot, respectively, and outputs first and second detection signals corresponding to respective power levels of the first and second lights, the first and second portions being formed by splitting the spot into two portions in parallel with a scanning direction, said wobble signal detection circuit comprising:

a sample-and-hold circuit sampling and holding the first and second detection signals output from said photodetector during the recording of the data onto the optical disk;

gain adjustment means for adjusting noise levels of noise components included in the respective first and second detection signals to approximately the same level, the noise components being generated by sampling the respective first and second detection signals in said sample-and-hold circuit; and

subtraction means for calculating a difference between the first and second detection signals respectively output from said gain adjustment means.

4. (Original) The wobble signal detection circuit as claimed in claim 3, wherein said gain adjustment means adjusts a gain with respect to each of the first and second detection signals output from said sample-and-hold circuit.

5. (Original) The wobble signal detection circuit as claimed in claim 3, wherein said gain adjustment means adjusts a gain with respect to one of the first and second detection signals output from said sample-and-hold circuit.

6. (Original) An optical disk apparatus for recording data onto and reproducing data from an optical disk by detecting a wobble signal by focusing a light beam into a spot on a pregroove on the optical disk, said optical disk apparatus comprising:

a photodetector which detects first and second lights from first and second portions of the spot, respectively, and outputs first and second detection signals corresponding to respective power levels of the first and second lights, the first and second portions being formed by splitting the spot into two portions in parallel with a scanning direction; and

a wobble signal detection circuit,

said wobble signal detection circuit comprising:

a sample-and-hold circuit sampling and holding the first and second detection signals output from said photodetector during the recording of the data onto the optical disk;

lowpass filter means for reducing noise components of the respective first and second detection signals, the noise components being generated by sampling the respective first and second detection signals in said sample-and-hold circuit; and

subtraction means for calculating the difference between the first and second detection signals respectively output from said lowpass filter means so as to obtain the wobble signal.

7. (Currently Amended) The optical disk apparatus as claimed in claim 6, wherein:

~~said photodetector detects third, fourth, fifth and sixth lights from third, fourth, fifth and sixth portions of the spot, respectively, and outputs thirds, fourth, fifth and sixth detection signals corresponding to respective power levels of the third, fourth, fifth and sixth detected lights, the third and fourth portions being formed by splitting the first portion into two portions perpendicularly to the scanning direction, and the fifth and sixth portions being formed by splitting the second portion into two portions perpendicularly to the scanning direction~~ includes first, second, third, and fourth detector parts detecting corresponding light beams reflected from the spot and outputting respective detection signals corresponding to power levels of the detected light beams, the photodetector being split along the scanning direction into first and second half portions, the first half portion being split along a direction perpendicular to the scanning direction into the first and second detector parts and the second half portion being split along the direction perpendicular to the scanning direction into the third and fourth detector parts; and

said sample-and-hold circuit samples and holds the ~~third, fourth, fifth and sixth~~ detection signals output from the first, second, third, and fourth detector parts of said photodetector during the recording of the data onto the optical disk,

said wobble signal detection circuit further comprising an adding circuit to which the ~~third, fourth, fifth and sixth~~ detection signals output from the first, second, third and fourth detector parts are supplied from said sample-and-hold circuit so that the ~~third and fourth~~ detection signals output from the first and second detector parts are added to be supplied to said lowpass filter means, and the ~~fifth and sixth~~ detection signals output from the third and fourth detector parts are added to be supplied to said lowpass filter means.

8. (Original) An optical disk apparatus for recording data onto and reproducing data from an optical disk by detecting a wobble signal by focusing a light beam into a spot on a pregroove on the optical disk, said optical disk apparatus comprising:

a photodetector which detects first and second lights from first and second portions of the spot, respectively, and outputs first and second detection signals corresponding to respective power levels of the first and second lights, the first and second portions being formed by splitting the spot into two portions in parallel with a scanning direction; and

a wobble signal detection circuit,

said wobble signal detection circuit comprising:

a sample-and-hold circuit sampling and holding the first and second detection signals output from said photodetector during the recording of the data onto the optical disk;

gain adjustment means for adjusting noise levels of noise components included in the respective first and second detection signals to approximately the same level, the noise components being generated by sampling the respective first and second detection signals in said sample-and-hold circuit; and

subtraction means for calculating a difference between the first and second detection signals respectively output from said gain adjustment means.

9. (original) The optical disk apparatus as claimed in claim 8, wherein said gain adjustment means adjusts a gain with respect to each of the first and second detection signals output from said sample-and-hold circuit.

10. (original) The optical disk apparatus as claimed in claim 8, wherein said gain adjustment means adjusts a gain with respect to one of the first and second detection signals output from said sample-and-hold circuit.